

PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements in or relating to Rifles

I, Sir CHARLES DENNISTOUN BURNEY, Bart., C.M.G., a British Subject, of Baynards Park, near Cranleigh, Surrey, do hereby declare the nature of this invention to be as follows:

The present invention relates to rifles viz. rifled small arms, generally fired from the shoulder, and it has for its object to provide an improved construction of rifle giving considerably higher performance than normal rifles, in so far as range is concerned.

The invention partly concerns the cartridge chamber and barrel, in consequence whereof it may also concern the general layout of the gun, and it also concerns the ammunition.

In the case of normal rifles the cartridge fits closely in the cartridge chamber but in a rifle according to the invention, the volume of the cartridge chamber is substantially greater than that of the cartridge case, so that there is what may be termed a "free" chamber space surrounding the cartridge case, into which the gases can pass from the cartridge case, which accordingly has a perforated wall or is otherwise constructed to allow the passage of gases into the free chamber space. Thus the relation between the chamber volume and the barrel bore volume will be high in comparison with standard practice, in consequence of which the pressure space curve will have a high mean value, owing to the reservoir effect of the free chamber space, and increase of range will result.

According to a further important part of the invention the pitch of the rifling is reduced to give a higher rate of spin to the bullet. An important consequence of this latter feature of the invention is that the diameter of the barrel bore can be reduced and the length of the bullet

increased whilst maintaining the same weight of bullet. From this it follows that the ballistic coefficient will be increased and thus there will be a substantial increase of range which will more than compensate for the loss of acceleration due to the reduction in diameter of the bullet.

Part of the weight saved by reducing the barrel bore may be utilised to increase the length of the barrel, which owing to the improved pressure space curve will contribute largely to increase of range.

In consequence of increasing the length of the barrel, in order to maintain the centre of gravity of the rifle in substantially the same position along the rifle, the whole barrel and chamber may be shifted rearwardly in relation to the stock, so that the chamber and therewith the magazine comes in rear of the trigger, which must be maintained at the standard distance forward of the butt of the shoulder stock. This magazine may be housed in a slot in the stock itself or may project laterally of the chamber and stock.

In carrying the invention into practice, for example, the chamber volume may be such as to produce, surrounding the cartridge case, a "free" chamber space of say 20% to 40% of the bore volume, coupled with a reduction of the rifling pitch from 1 in 30 to about 1 in 20 calibres.

The invention is applicable to all types of rifles, so that it includes not only service rifles but also sporting rifles.

Dated this 13th day of March, 1945.

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COMPLETE SPECIFICATION

Improvements in or relating to Rifles or other Quick Firing Guns
using Fixed Ammunition

I, Sir CHARLES DENNISTOUN BURNEY, Bart., C.M.G., a British Subject, of

[P]

Baynards Park, near Cranleigh, Surrey,
do hereby declare the nature of this

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invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 The present invention relates to rifles and like small arms, and also to quick firing ordnance, all of which use fixed ammunition viz. ammunition in which the propellant charge is contained in a cartridge casing attached to the base end of the bullet or other projectile.

10 The object of this invention is to provide an improved construction of gun whereby better performance in regard to 15 range is obtained with a given size of ammunition, without necessarily increasing the chamber pressure.

15 The invention mainly concerns the cartridge chamber and barrel, but it also concerns the general layout of the gun. Moreover the invention involves the use of 20 fixed ammunition having a cartridge case with a perforated wall, in accordance with my prior but concurrent application for 25 Letters Patent No. 5809/44.

In the case of normal rifles and quick firing guns the cartridge fits closely in the cartridge chamber, but in a rifle or gun according to this invention, the 30 diameter of the cartridge chamber is greater than that of the breech opening through which the cartridge case is loaded into the chamber, so that there is what may be termed a "free" chamber 35 space surrounding the cartridge case, into which the gases can pass from the perforated cartridge case. Preferably the relation between the chamber volume and the barrel bore volume is high in comparison with standard practice, namely 40 25-50% thereof, in consequence of which the pressure space curve will have a high mean value, owing to the reservoir effect of the free chamber space, and increase 45 of muzzle velocity and range will result with a given length of barrel and maximum chamber pressure.

Thus it is an important feature of this 50 invention that the cartridge chamber is increased in volume by increasing its diameter whereby its wall is annularly spaced from the wall of the cartridge case to form a gas reservoir or chamber, so that if the cartridge case is perforated 55 or made of skeleton construction the explosion gases are able to enter the annular gas chamber surrounding the cartridge case. In consequence of this construction, although the maximum 60 pressure is not increased, the pressure space curve is so improved in form that by an adjustment of the propellant charge, owing to the reservoir effect of the annular gas chamber, the muzzle 65 velocity and range can be materially

increased by increasing the barrel length.

In order to obtain the greatest benefit from the increased muzzle velocity, in regard to range, it is desirable also to increase the ballistic coefficient of the 70 projectile, and with a projectile of given calibre this is effected by increasing the length of the projectile, so as to increase its weight without increasing its head resistance. However for flight stability 75 this increased length of projectile demands a high rate of spin of the projectile which it is the function of the barrel rifling to produce.

According to a further important part 80 of the invention, therefore, the pitch of the rifling is reduced in comparison with standard practice so as to give a higher rate of spin to the projectile or bullet. Thus the reduction in pitch of the barrel 85 rifling enables the length of the bullet and the ballistic coefficient to be increased, accompanied by a further substantial increase of range.

Part of the weight saved by reducing 90 the barrel bore may be utilised to increase the length of the barrel, which owing to the improved pressure space curve will contribute largely to increase of range.

In consequence of increasing the length 95 of the barrel, and in order to prevent the centre of gravity of a rifle moving forward in relation to the butt plate, the whole barrel and chamber is preferably shifted rearwardly in relation to the stock, so that 100 the chamber and therewith the magazine comes in rear of the trigger, which must be maintained at the standard distance forward of the shoulder plate of the butt. This magazine may be housed in a slot in 105 the stock itself or may project laterally of the chamber and butt.

In order that the invention may be clearly understood and readily carried into practice it is illustrated, by way of 110 example only, by the accompanying drawings, in which:—

Figure 1 is a sectional view of the cartridge chamber of a gun according to the invention;

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Figure 2 is a longitudinal section of a shoulder rifle according to the invention, and

and

Figure 3 is a plan view of the butt end of the rifle showing the position of the 120 magazine.

Referring to Figure 1, the barrel 1 merges at its rear end into the forward portion 2 of the cartridge chamber 3, whose rear portion 4 screws on to the forward portion 2 at 5, and supports the breech ring 6, through which the rounds of ammunition are inserted into the cartridge chamber, and which supports and locates the rear end of the cartridge case 7. 130

The cartridge case 7 has its wall perforated at 8 and its forward end fits on to the base of the projectile 9 behind the driving band 10. The cartridge case 7 is lined with waterproof paper 11 or the like readily consumable covering for the cordite propelling charge (not shown), and at its rear end the case 7 is screwed into the base cap 12 carrying the ignition 10 cap and primer (not shown). The forward end of the skirt 13 of the base cap is reduced in thickness at 14, so as to leave an annular space between the wall of the cartridge case 7 and the skirt 13 of the 15 base cap 12. Consequently when explosion takes place the gases freely fill the chamber 3 and enter the said annular space, whereby the gas pressure is enabled to expand the end portion 14 of skirt 13 very tightly against the breech ring 6. The gas pressure within the base cap 12 will also expand the main part of the skirt 13 against the breech ring 6 so that obturation will take place as a whole over 20 the distance "X:" with very tight obturation round the reduced skirt portion 14.

In accordance with the invention the dimensions of the cartridge chamber 3 are such that the total chamber volume lies 30 within the range 25—50% of the barrel bore volume. The difference in volume between this chamber volume and the cartridge volume constitutes the "free" 35 volume, and since the cartridge case will be substantially the same length as the chamber it follows that the internal diameter of the cartridge chamber will be substantially greater than the diameter of the cartridge, and therefore than that of the breech aperture through which the cartridge is loaded into the chamber.

Referring now to Figures 2 and 3 the 45 enlarged chamber 15 is formed integral with the rear end of barrel 16, and its volume is such in relation to the volume of the perforated cartridge case 17 which limits the volume of the propellant 50 charge, that the internal wall of the chamber 15 is spaced from the wall of the cartridge case 17.

The cartridge 17 is loaded into the chamber by means of a bolt 18 operated by suitable mechanism and comprising the firing pin 19.

In normal service rifles the trigger is in rear of the chamber, but in the case of the present invention, since it will be 60 advantageous to increase the range by increasing the length of the barrel, it will be desirable, in order to preserve the proper balance of the rifle, to shift the barrel rearwardly. This would normally bring the trigger mechanism too near to

the shoulder of the firer for comfortable use. Accordingly the trigger mechanism 20 is maintained at its normal distance from the end of the butt 21, so that it lies beneath the chamber 15. 70

Since the lever train between the trigger 20 and the firing pin 19 will now traverse the position usually occupied by the magazine, this is disposed at 22 extending laterally on the left hand side 75 of the gun, also in rear of the trigger mechanism 20.

The barrel 16 may have the normal number of rifling grooves but instead of having the normal pitch of 1 in 30 80 calibres, they may have in accordance with this invention, a pitch of about 1 in 20 calibres.

As before the chamber volume lies 85 within the range 25—50% of the barrel bore volume. Thus if, for example, the barrel bore volume of the rifle is 1.7 cu. ins. the total chamber volume may be .593 cu. ins. viz. substantially 35% of the barrel bore volume. 90

The invention is applicable to all types of quick firing service guns and to sporting rifles, in addition to all types of service rifles, all of which use fixed type ammunition. 95

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A quick firing gun or rifle using fixed ammunition with a perforated wall, the diameter of the cartridge chamber being greater than that of the breech opening through which the cartridge is 105 loaded into the chamber, so that a "free" chamber space is produced round the cartridge when loaded.

2. A gun according to claim 1, having a barrel rifled with a pitch less than 1 in 110 30 calibres.

3. A gun according to any of the preceding claims, wherein the total chamber volume i.e. comprising the cartridge volume and the "free" volume, lies 115 within the range 25—50% of the barrel bore volume.

4. A gun according to any of the preceding claims, in which the diameter of the cartridge chamber between the band 120 seating at the lead end of the barrel bore and the breech opening by which the base end of the cartridge is located, and through which it is loaded, is greater than that of the said breech opening and barrel 125 bore, so that the wall of the cartridge chamber between its ends is spaced from the cartridge case.

5. A rifle or small arm according to any of claims 1 to 5, wherein the chamber and 130

magazine are disposed in rear of the trigger mechanism.

6. A rifle according to claim 5, wherein the magazine projects laterally from the side of the breech end of the rifle.

7. Quick firing guns using ammunition of fixed type substantially as herein described with reference to, and as illustrated by, Figure 1 of the accompanying drawings.

S. Rifles and small arms substantially as herein described with reference to, and as illustrated by, Figures 2 and 3 of the accompanying drawings.

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Dated this 15th day of June, 1945.

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(This Drawing is a reproduction of the Original on a reduced scale.)

FIG.1.

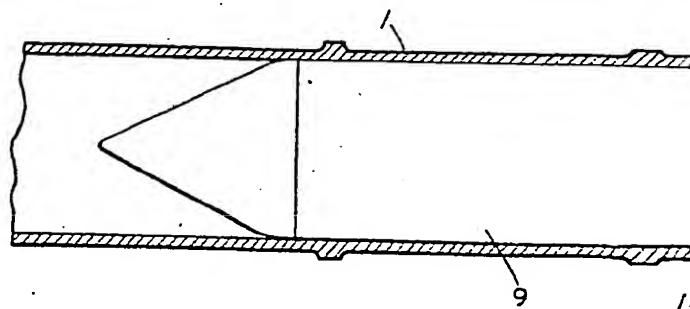
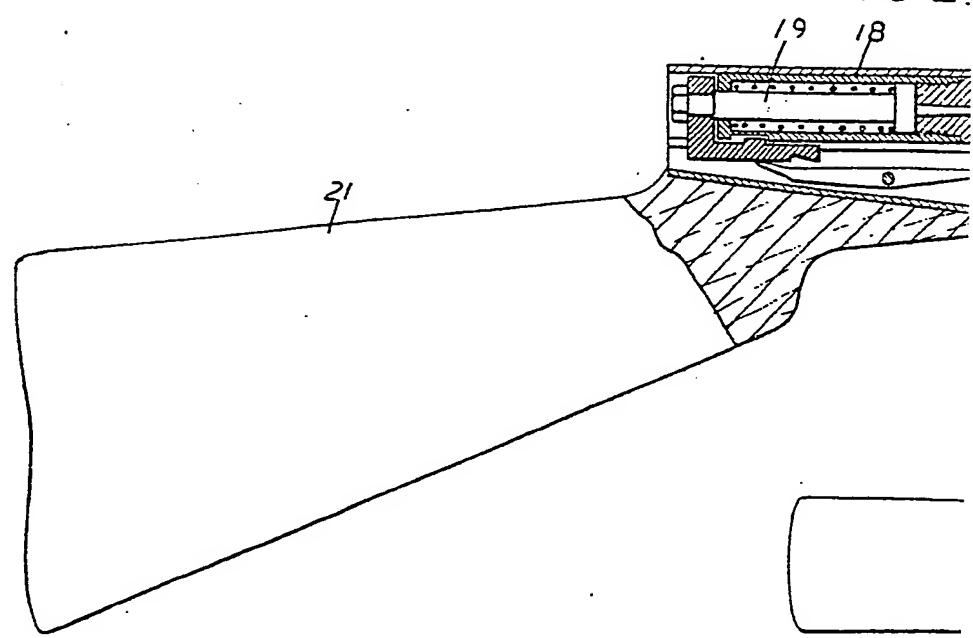
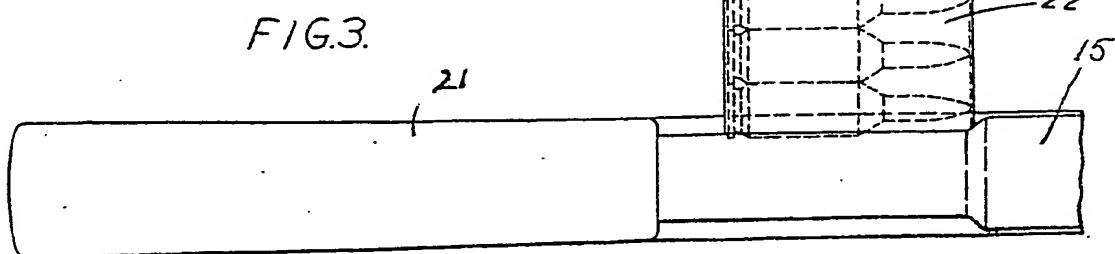
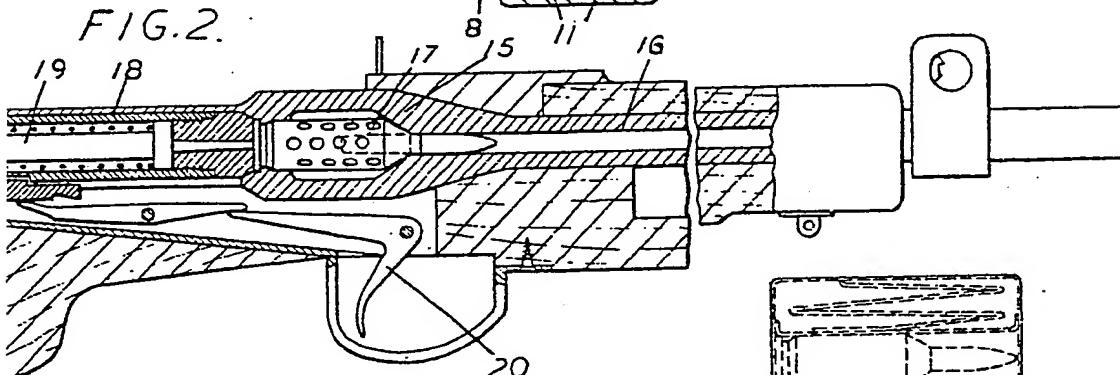
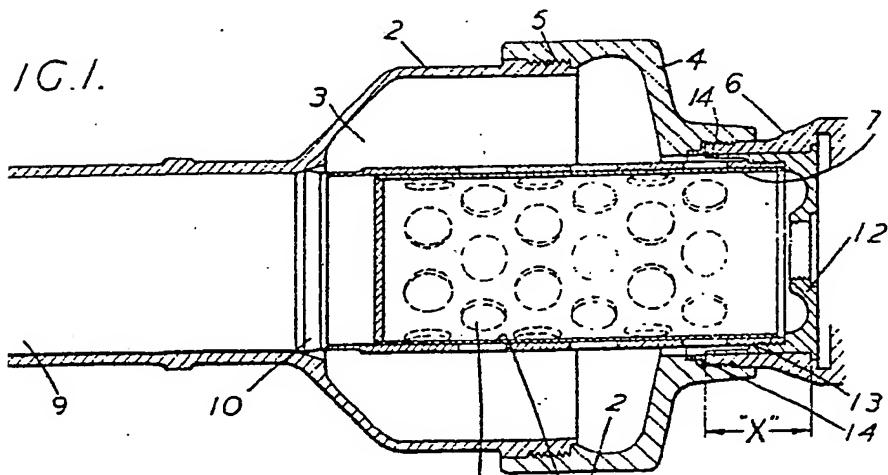


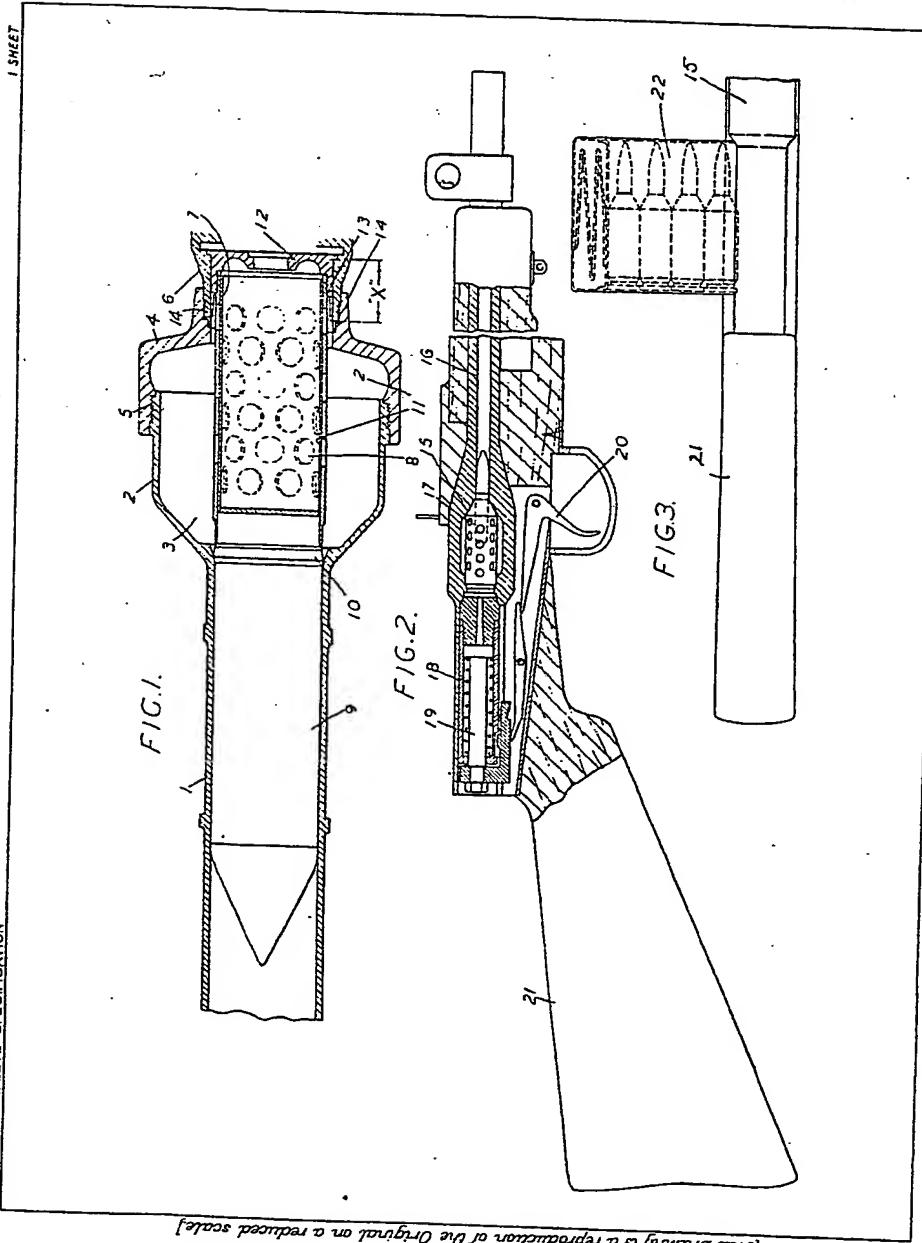
FIG.2.





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1 SHEET



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